BEFORE THE STATE OF WASHINGTON

ENERGY FACILITY SITE EVALUATION COUNCIL

In the Matter of Application No. 2003-01: SAGEBRUSH POWER PARTNERS, LLC; KITTITAS VALLEY WIND POWER PROJECT	EXHIBIT 34 SUP (TP-T SUP)

APPLICANT'S PREFILED SUPPLEMENTAL DIRECT TESTIMONY
WITNESS #15: THOMAS PRIESTLEY

Q Please state your name and business address.

A My name is Thomas Priestley and my business address is 155 Grand Ave. Suite 1000, Oakland, CA 94612.

Q Have you previously filed prepared testimony in this matter?

A Yes

Q Is this testimony given to supplement your prior testimony?

A Yes

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Q. What is the specific purpose of this supplement to your prior testimony?

A In 2005, Horizon Wind Energy (formerly Zilkha Renewable Energy) redesigned the project layout to respond to comments on project visual aspects, aesthetics, and lighting raised by the Kittitas County Commissioners, County staff, adjacent landowners, and the general public. The project as originally proposed would have entailed installation of up to 150 turbines. Under the revised layout, the number of turbines was significantly reduced, making it possible to eliminate turbines located in the areas about which the greatest levels of public concern about aesthetic impacts had been expressed.

To assess the aesthetic effects of the revised project layout, I conducted a systematic evaluation that applied the same methodology I employed in preparing the original analysis of the project's visual impacts that was included in the Application for Site Certification and later incorporated into the DEIS issued by EFSEC. This evaluation is documented in a technical memorandum (*Analysis of the Visual Resources Impacts of the Revised Kittitas Valley Wind Power Project*, Thomas Priestley, PhD, November 7, 2005). As was the case with the original visual assessment, the analysis methodology I used was based on the widely accepted analysis approaches developed by Federal land management agencies and the US Department of Transportation.

Q Would you please identify what has been marked for identification as Exhibit 34-14 (TP-14)

A Exhibit 34-14 (TP-14) the technical memorandum entitled "*Analysis of the Visual Resources Impacts of the Revised Kittitas Valley Wind Power Project*" referenced above, that I authored.

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Q Is the information in this exhibit within your area of authority and /or expertise?

A Yes

Q Is the content of this exhibit based upon your own knowledge, or upon evidence, such as studies and reportsm that a reasonably prudent person in your field and expertise is accustomed to rely in the conduct of their affairs?

A Yes.

Q Is the content of this exhibit accurate?

A Yes.

Q Do you incorporate the facts and content of this exhibit as part of your testimony?

A Yes.

Q Do you sponsor the admission of this exhibit into evidence?

A Yes.

Q Please summarize the conclusions of your analysis regarding the new layout.

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A The bottom line of my analysis of the revised project layout was that from most of the viewpoints evaluated in the original project EIS, the project's aesthetic impacts will be moderately to substantially reduced. At the time that Kittitas County held its hearings on this project in January, 2006, this analysis of the revised project's aesthetic effects served as the basis for the testimony that I provided at those proceedings

In early June 2006, Kittitas County made its final decision regarding County permitting of the Kittitas Valley Wind Power Project. I have reviewed the County record regarding the visual issues. What I have found is that for the most part that the County has concurred with me about the project's less than significant visual impacts. The one area in which the County and I disagree has to do with aesthetic and shadow flicker impacts in the area within 2,500 feet of turbines. Commissioner Huston stated a concern to a "looming" effect of turbines within 2,500 feet.

Q Was the County's analysis as shown in the record prepared based on use of accepted visual assessment protocols that are commonly used by state and federal agencies?

A No. As far as I could tell they used no protocols.

Q Do you disagree with the conclusions of the county you referenced above?

A Yes

Q What is the basis for your disagreement?

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A Part of the reason for this disagreement relates to the County's treatment of the issue of visual sensitivity as it was presented in my original visual assessment in the ASC, and as it was repeated in the EIS prepared on behalf of EFSEC. As a part of the process of assessing the aesthetic impacts of potential change to the landscape, the standard professional approach is to document the existing visual character and quality of the landscape and its sensitivity to potential visual change. Sensitivity to visual change is usually evaluated in terms of the numbers and types of viewers in the area. Residential and certain kinds of recreational viewers are usually assumed to be the most potentially sensitive to visual alterations of the landscape. In the case of this project, a high degree of sensitivity was assigned to residences located within the foreground zone (up to ½ mile) of the proposed turbines. It is important to note that visual sensitivity is not the same as visual impact, but instead is only one of the considerations that go into the final determination of impact. In determining potential impacts of proposed projects, account is taken of a range of factors, including the degree of visibility of the new feature, the degree and nature of the visual change created, the effects on the visual character and quality of the view, and the sensitivity of the viewers. As this explanation suggests, it is incorrect to assume that the level of viewer sensitivity translates directly to the level of visual impact.

Because of its confusion between level of viewer sensitivity and level of visual impact, the County moves very quickly to the conclusion that all turbines must be set back 2,500 feet from residences. As a consequence, the County's record related to project aesthetic impacts focuses almost exclusively on the 2,500 foot setback issue to the detriment of a wider and better informed consideration of the factors determining the degree of impact. A point to note here is that in its review of the findings of the ASC and EIS aesthetic

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analyses, the County took the findings that those analyses described as "moderate to high" and has misrepresented those findings as findings of "high" impacts. From there, the County asserts that a "high impact is a significant adverse environmental impact." This assertion was made without detailed analysis or any reference to the criteria used to establish the significance of impacts under SEPA. That assertion is not based on the analysis of the EFSEC DEIS and the Addendum thereto. Building on this questionable chain of assertions, the County argues that because the places where "significant" impacts were found were places in close proximity to turbines, the only solution is to increase viewer distance from turbines through the use of 2,500 foot setbacks from all residences.

My professional opinion is that County's insistence that all turbines must be set back 2,500 feet from residences is not a sound decision. This is a rigid requirement that does not reflect the fact that in many cases, although turbines proposed as a part of the KVWPP project may be located within 2,500 of residences, they have relatively little aesthetic impact because they are situated in places where they are either barely visible or not visible at all from the residence and/or they have little or no effect on the most important views available from the residence. In response to the County's ruling related to the 2,500 foot setback issue, during the week of June 26-30, I made a thorough investigation of the residences located within 2,500 feet of proposed turbines. This investigation included a close review of maps created using a geographic information system (GIS), and both on-the-ground and helicopter-based field reconnaissance. The results of my investigation are contained in the following table and map. I have assumed a worst case scenario for the turbines with a tip height of 410 feet rather than the more likely turbine with a tip height of 367 feet.

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The map below (Figure 1) indicates the boundaries of the properties included in the project site, the locations of each of the turbines proposed as part of the project, and the locations of all non-participating residences located within 2,500 feet of proposed turbines.

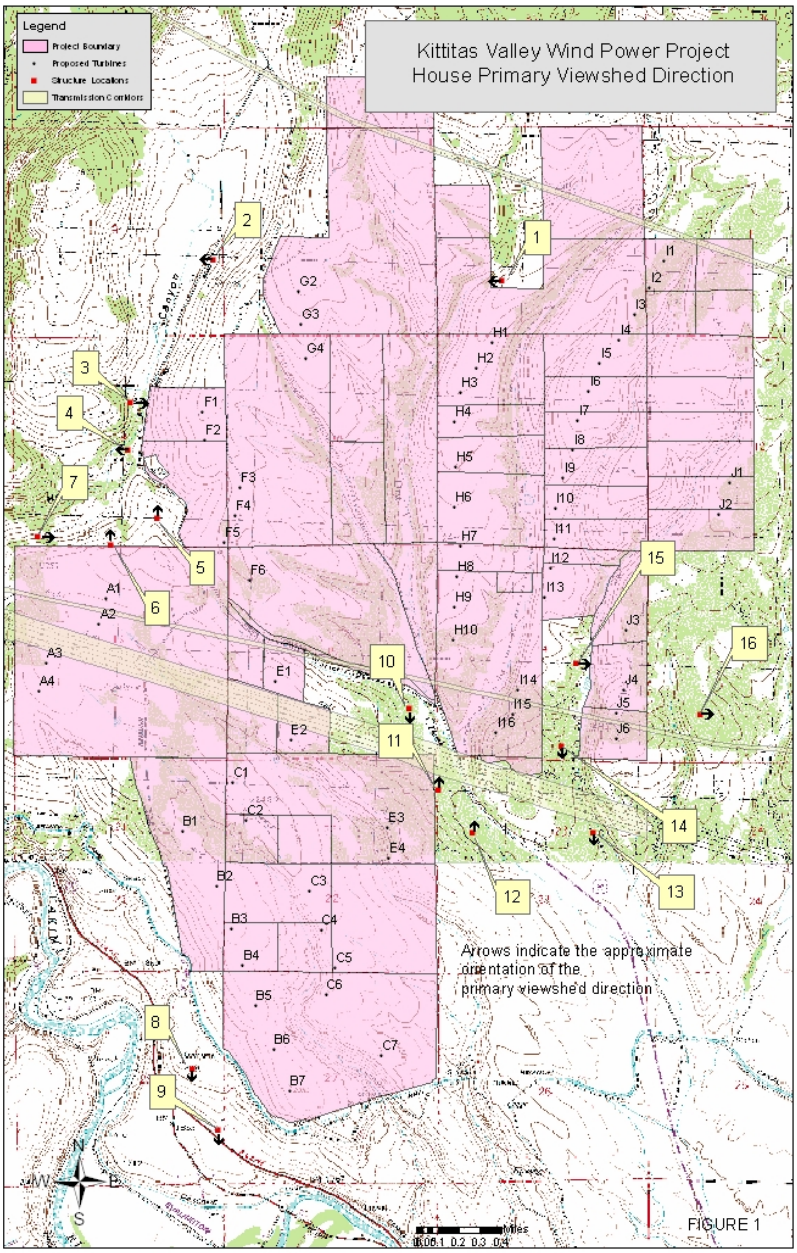

FIGURE 1

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Table 1 below provides a summary of the insights gained through the map review and ground level and aerial investigation. The locations and distances of the turbines to the respective residences are approximate. For the purposes of this analysis the turbine locations are assumed to be as designated in Figure 2 of the supplemental testimony of Chris Taylor (Exhibit 20 SUP (CT-T-SUP). The final locations are assumed to not be significantly different than as stated, but will be subject to the siting factors set out in the testimony of Andrew Young and Chris Taylor. For each residence located within 2,500 feet of a proposed turbine, note is made of the distances to turbines located within 2,500 feet, the orientation of the house, the relationship of this orientation to the turbines, and notes related to the relationship of the turbines to the residence's primary viewshed. The primary viewshed was identified by evaluating the orientation of the residence, and the orientation of the residence's major windows, porches, and decks. Table 1 also includes a notation of Distance Zone. This Distance Zone, which I will describe in more detail later in my testimony, is an indicator of the turbine's relative degree of visual dominance. For reasons that I will explain, turbines located in Zones 1 and 2 have the potential to dominate the view, while turbines located in Zone 3 are set far enough back into the scene that they would not be considered to be visually dominant.

TABLE 1 – SUMMARY OF RELATIONSHIPS OF RESIDENCES TO PROPOSED TURBINES LOCATED WITHIN 2,500 FEET

Residence Map ID Reference	Turbine	Approximate Distance	Distance Zone	Orientation of House	Orientation of Residence in Relation to Turbine	Viewshed Notes
1	H1	1,590	2	West	Side	Turbine not in primary viewshed
	H2	2,280	3	West	Side	Turbine not in primary viewshed
2	G2	2,290	3	West	Away	View blocked by Terrain
3	F1	1,830	3	East	Towards	View partially blocked by Trees
	F2	2,080	3	East	Towards	View partially blocked by Trees

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4	F1	2,100	3	West	Away	Turbine not in primary viewshed
	F2	1,920	3	West	Away	Turbine not in primary viewshed
5	F2	2,270	3	North	Towards	Clear View - 2,267'
	F3	2,190	3	North	Side	Turbine not in primary viewshed
	F4	1,940	3	North	Side	Turbine not in primary viewshed
	F5	1,770	3	North	Side	Turbine not in primary viewshed
	A1	2,280	3	North	Away	Turbine not in primary viewshed
6	A1	1,290	2	Northwest	Away	View largely blocked by Terrain (only top of turbine blades have the potential to be visible)
	A2	2,010	3	Northwest	Away	View largely blocked by Terrain (only top of turbine blades have the potential to be visible)
7	A1	2,350	3	West	Side	View substantially blocked by Trees (only top of turbine blades have the potential to be visible)
8	B5	2,240	3	South	Away	Turbine not in primary viewshed
	B6	2,090	3	South	Away	Turbine not in primary viewshed
	B7	2,490	3	South	Away	Turbine not in primary viewshed
9	B6	2,450	3	South	Away	View largely Blocked by Trees & Terrain
	B7	2,050	3	South	Away	View largely Blocked by Trees & Terrain
10	H10	2,290	3	Southeast	Away	Turbine not in primary viewshed
	I16	2,240	3	South	Side	Turbine not in primary viewshed
11	E3	1,570	2	North	Away	Turbine not in primary viewshed
	E4	2,100	3	North	Away	turbine not in primary viewshed
	I16	2,030	3	North	Towards	View through Transmission Lines
12	E3	2,130	3	North	Side	Turbine not in primary viewshed
	E4	2,190	3	North	Side	Turbine not in primary viewshed
13	J6	2,400	3	Southwest	Away	View Blocked by Trees, Terrain & Transmission Lines
14	I14	1,770	3	Southeast	Away	Turbine not in primary viewshed
	I15	1,670	3	South	Away	Turbine not in primary viewshed
	J4	2,100	3	South	Away	Turbine not in primary viewshed
	J5	1,580	2	South	Away	Turbine not in primary viewshed

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	J6	1,330	2	South	Away	Turbine not in primary viewshed
15	I13	1,850	3	East	Away	Turbine not in primary viewshed
	I14	1,610	2	East	Away	Turbine not in primary viewshed
	I15	2,010	3	East	Away	Turbine not in primary viewshed
	J3	1,490	2	East	Towards	Clear View - 2,011'
	J4	1,350	2	East	Towards	Clear View - 1,353'
	J5	1,580	2	East	Towards	Clear View - 1,583'
	J6	2,080	3	East	Towards	Clear View - 2,078'
16	J4	2,030	3	East	Away	No View, Cargo Containers, no windows
	J5	2,130	3	East	Away	No View, Cargo Containers, no windows
	J6	2,300	3	East	Away	No View, Cargo Containers, no windows

One of the basic findings of this detailed investigation is that although the county had stated that there are twenty-seven residences of nonparticipating property owners located within 2,500 feet of proposed turbines (statement by Commissioner David Bowen, May 3, 2006, page 10, line 24 of transcripts, Exhibit 6 of Second Request for Preemption), there are in fact no more than 16 houses that lie within 2,500 feet of proposed turbines.

As the summary provided in Table 1 indicates, the detailed on-the-ground and aerial investigations revealed that in many cases the turbines that would be located within 2,500 feet of a house would not be prominently visible from the houses because they may be screened to varying degrees by intervening topography and/or because they were not located within the views from the residence. For example, in the Bettas Road area, a number of the residences are oriented toward the northwest to capture the views toward the Stuart Range, placing the turbine sites to the backs of the residences and outside of their primary viewsheds.

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Specifically, of the 16 residences referred to above, views from one of the residences toward turbines within 2,500 feet would be completely screened by the intervening topography. From five additional residences, views toward turbines located within 2,500 feet would be substantially screened by topography and vegetation. In the case of seven of the 16 residences, the turbines that would be sited within 2,500 feet would not be located within the residence's primary viewshed. In views from three of the residences, some of the turbines that would be sited within 2,500 feet would be located outside of the primary viewshed of the residence, while others would be located within it. In cases where turbines would be readily visible in the views from residences, the question remains how much of a setback between turbines and residences is required to protect the residential view from being visually dominated by the presence of the turbine. This is the "looming' concern as stated by the BOCC referenced above. Although the County states that the 1,320 foot setback (1/4 mile) proposed by the Applicant isn't enough and insists on a setback of 2,500 feet, it hasn't provided any real evidence to support these assertions. A ¼ mile setback should be adequate to mitigate against any potential affect of a turbine visually dominating the view.

The County's assertion that a setback of ¼ mile is not adequate to protect residential views from being visually dominated by turbines is not supported by the actual turbine views that can be observed at existing wind power projects. The visual evidence observable at these sites indicates that for turbines with dimensions generally similar to those proposed for the Kittitas Valley Project, a ¼ mile setback would be adequate to prevent turbines from visually dominating the view. This relationship can be seen in the following photos of existing turbines at the Klondike Wind Power Project in Sherman County, Oregon. The turbines at the Klondike site are GE 1.5 MW units that are

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mounted on towers with a hub height of 80 meters, and that use rotors with a diameter of 77 meters. The height to the tip of the blade 389 feet. Under my direction, photos were taken of a turbine at this site at a distance equivalent to 4 times the turbine's height, which in this case, was 1, 175 feet, and at 1320 feet and 2,500 feet. All photos were taken within a few feet of that elevation, based on the readings provided by a Garmin GPS unit. The accuracy of the viewing distances was established by using a range finder and the Garmin GPS. The photos were taken with a 35 mm camera with the equivalent of a 50 mm lens to produce an image that is comparable to what is seen by the human eye. Review of Figure 2 indicates that at a viewing distance of four times the height to the tip of the blade, (which in this case is a little under 1/4 mile), the entire turbine is contained within the field of view, and because it is entirely contained within the area taken in by the human eye, it is less than dominant in the view. Review of Figures 3 (viewing distance of 1,320 feet) and Figure 4 (viewing distance of 2,500 feet) indicates that at increasing distances, the turbine continues to be contained within the field of view, and similar to the 4-times-the-height-distance-view seen in Figure 2, the turbine is less than dominant in the view.

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Figure 2: Klondike II 1,175’

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Figure 3: Klondike II 1,320’

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Figure 4: Klondike II 2,500’

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Further the minimum of ¼ mile from non-participating residences proposed by the Applicant has a very sound basis in research literature. The visual evidence from the Klondike Project supporting the adequacy of a ¼ mile setback for turbines in the size-class proposed for the Kittitas Valley Project is consistent with the principles related to scalar relationships and perceptions of visual dominance found in the environmental design literature. For the Kittitas Valley Project, the Applicant's proposed ¼ mile setback from non-participating residences is compatible with the principles the design research literature has established that relate the relative dominance of structures to ratios of the height of the structure to the distance from which it is viewed[1]. This research has determined that the "normal" field of view, the area that can be seen without moving the eyes or head, takes in the area defined by a viewing angle of 12 degrees above and below the horizon. Thus, when a person is far enough away from a structure to see it at an angle of 12 degrees or less, the structure's entire height is fully contained within their overall view. When a person is closer to the structure and views it at angles between 12 degrees and 27 degrees, seeing the structure's entire height requires the eyes to move, but does not require head movement. When a person is even closer and views the structure at angles of 27 degrees or greater, both the head and eyes have to move in order to see the structure's full height. The angle at which a structure is viewed can be related to the ratio between its height and its distance from the person doing the viewing. When the viewing distances is equal to the height of the structure (height-distance ratio of 1:1), the viewing angle is 45 degrees. When the viewing distance is two times the height of the structure (height-distance ratio of 1:2) the viewing angle is 23 degrees. When the viewing distance

[1] This research, which was carried out by Maertens in Germany in the nineteenth century, was applied in and influential article published Hans Blumenfeld in 1953, and was used more recently by Weber (1984) as the basis for the development of principles of scale for architecture and environmental design.

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is three times the height (height-distance ratio of 1:3), the viewing angle is 18 degrees and when the viewing distance is four times the height, the viewing angle is 12 degrees.

This approach can be used to measure a structure's relative sense of dominance to the immediate surrounding area. The height-distance relationships have been classified into three zones that reflect the relative degree to which a structure's height dominates its surroundings. Zone 1 is when a view is very close (at height-distance of 1:2 or less). The structure will fill the field of vision and the viewer may feel insignificant compared to the size of the structure. In Zone 2 where the height-distance ratios range from 1:2 to 1:4, the structure will dominate the view but begins to become part of the greater landscape. In Zone 3 where the height-distance ratio is 1:4 or more the structure is entirely contained within the normal field of view and becomes a subordinate part of the overall scene.

The Zones were calculated for the houses and respective turbines and shown in Table 1 above. The calculations assumed a worst case maximum turbine height of 410 feet (rather than the most likely turbine to be used with height of 367 feet) to the tip of the blade. As shown in the table all but four houses are in Zone 3. All houses in Zone 2 are the upper range of Zone 2 and all but one house is oriented away from the turbines. If the most likely turbine size is used, only one house, oriented away from the turbine would be in Zone 2

By insisting that all turbines be set back 2,500 feet from houses to mitigate for a perceived "looming" visual impact, the County would place unnecessary restrictions on turbines sited in areas where they would have relatively little impact on residential views. As can be seen from this analysis, the effect on the views to houses with turbines within

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2,500 feet is not as stated by the County. Instead of the 27 houses assumed to be affected there are actually only eleven that would have other than an insignificant view at the most due topography and screening. Of these eleven houses, the primary viewshed of all but one is not towards the turbines within 2,500 feet. Further, the view of the turbine ceases to dominate ("looming") at about 1,640 feet, (Zone 3). The degrees to which visual impacts are adverse significant depend on the viewer's location and sensitivity and the impact on view quality. Because of the fact that the primary viewsheds of houses that can actually see the turbines within 2,500 feet are overwhelmingly away from or not directly towards the turbines and because most of the turbines are located in Zone 3, the visual impacts are less than significant. For projects like the Kittitas Valley Wind Power Project, whose siting and design have shaped its overall visual impacts, any visual impact that might be identified as affecting small numbers of viewers must be evaluated in the context of the fact that on the whole, the projects visual impacts are relatively low.

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